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FAO

PLANT PROTECTION BULLETIN

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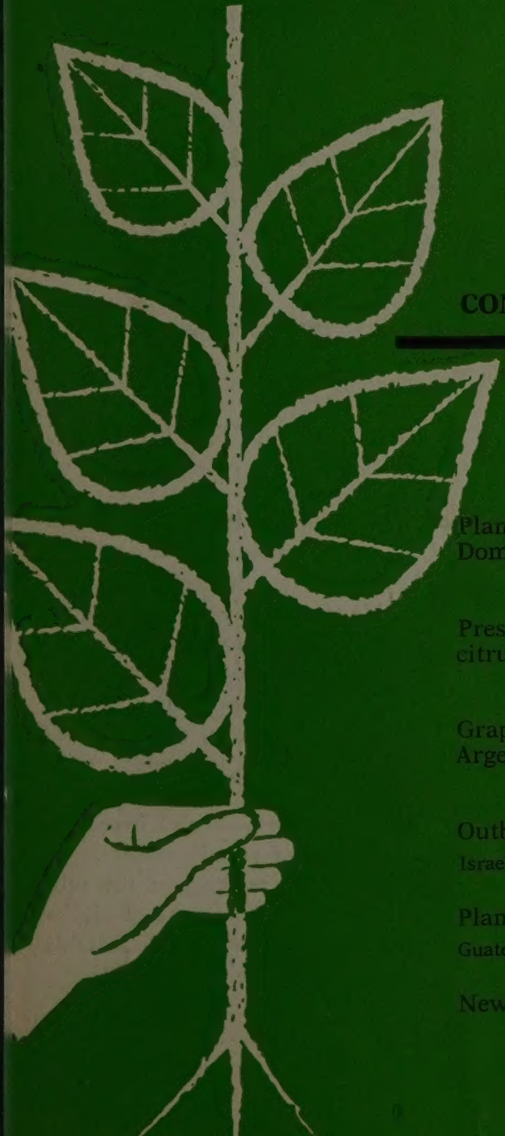
A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS



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FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

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FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

Plant Diseases of Economic Importance in the Dominican Republic

by *E. Castellani*, formerly Expanded Technical Assistance Program, FAO, Ciudad Trujillo

While serving on an FAO assignment in the Dominican Republic in 1958, the writer had the opportunity of visiting the main agricultural areas of the country to examine plant disease problems. Owing to his short stay in the country, only important diseases of the main crops were investigated.

Grain crops

Rice is one of the main food crops of the country. Brown spot (*Helminthosporium oryzae*), Cercospora spot (*Cercospora oryzae*) and blast (*Piricularia oryzae*) are common in all the areas visited. Cercospora spot is particularly prevalent on the lowland rice variety Toño Brea grown north of Santiago, and brown spot on the apparently very susceptible upland variety Fidelia in the Province of Trujillo. Blast is widespread but seems to be of little economic importance. In the places visited lesions were usually found on leaves and only very occasionally on stems. As the use of nitrogen fertilizers is on the increase, it may be expected that both blast and brown rot will cause more damage in the future. Leaf smut (*Entyloma oryzae*) and an unidentified species of nematodes were found only in a few places.

The hoja blanca virus disease, which has been causing much concern in the American tropics, occurs also in the Dominican Republic. According to farmers this disease has been known in the Dominican Republic for about 20 years but has never been reported. A brief note on its occurrence has been previously published. [1]

In irrigated rice fields in the area surrounded by Cruz de Guayacanes, Laguna Salada and Valverde, many normally developed rice plants of the variety Toño Brea were found to have empty white panicles and the young leaves were yellow or white at the tip and the margin. This disorder seems to be due to a high salt content of the irrigation water, but it may be a special manifestation of the hoja blanca disease.

On maize, the leaf rust (*Puccinia polysora*) and leaf spots caused by *Helminthosporium turcicum*, *Cercospora* sp. and other fungi, occur frequently but cause only negligible losses. Near Villa Tapia a dry foot rot with symptoms similar to those caused by *Macrophomina phaseoli* and ear rot caused by *Fusarium moniliforme* were observed. Smut (*Ustilago maydis*) is widespread, especially along the frontier with Haiti.

Banana and plantain

Sigatoka disease caused by *Mycosphaerella musicola* (*Cercospora musae*) is the most important foliar disease, causing severe damage to bananas wherever it is not controlled. In some plantations which were visited, infections covering more than 35 percent of the leaf surface were observed.

The Panama disease caused by *Fusarium oxysporum* f. *cubense* is doubtless the most

[1] Castellani, E. 1958. Dominican Republic: Occurrence of hoja blanca disease of rice. *FAO Plant Prot. Bull.* 7 : 29.

dangerous disease and was seen in many plantations during the surveys. The banana variety Johnson, which is practically the only one grown in the Dominican Republic for the export of fruit, was considered a few years ago to be rather resistant to the Panama disease, but it is now being severely attacked, especially in fields where this variety has been grown successively for many years. This could be due to the development of new virulent strains of the pathogens, but the long uninterrupted cultivation of banana in a field might also cause changes in the soil, which would affect the resistance of banana roots.

In this connection, it should be mentioned that *Musa corniculata* (rulo) is very susceptible to banana wilt disease and may facilitate its spread. A few years ago *M. corniculata* was widely grown in the Dominican Republic, but now only a small number of plants remains; those were examined and found to be infected by wilt.

Leaf spots caused by *Helminthosporium torulosum* and *Cordana musae* are rather unimportant. The latter was always found to attack tissues affected by *Cercospora musae*.

On plantain, only leaf spot caused by *Helminthosporium torulosum* was found to cause some damage. Infection by *Cercospora musae* is rather unusual and results in only small leaf spots.

Sugar cane

Sugar is a major industry in the Dominican Republic. Sugar cane mosaic does not appear to be important, as most varieties grown here are resistant. Clear mosaic symptoms were found on the variety B 42337, which seems to be rather tolerant to the infection. Mosaic was never found on the Indian variety Co 290, grown in various estates, and reported to be susceptible in other countries. The virus disease that causes most concern is the ratoon stunting disease. Hot water treatment of seed pieces has been carried out on a small scale, with satisfactory results.

Widespread, but of limited economic importance, are leaf spots caused by *Helminthosporium sacchari*, *Cercospora* spp. and *Xanthomonas rubrilineans*. In a sugar cane field that had not been harvested the previous year, a stalk rot was observed. It was probably caused by *Marasmius sacchari*, but the parasite could not be identified because of the lack of fructifications. In addition, red rot (*Colletotrichum falcatum*) and chlorosis, caused in one case by excess of lime and in another by molybdenum deficiency, were observed. A few isolated cases of smut (*Ustilago scitaminea*) and pokkah-bong (*Fusarium* sp.) had been reported from the Romana Sugar Estate.

Cacao

Pod rot (*Phytophthora palmivora*) was seen to occur in most of the cacao plantations visited. In addition to the rotting of both ripe and green pods, it causes necrosis of chupons and, on the Criollo variety in particular, stem canker. As reported from other countries, pod rot is usually more severe in areas with heavy rainfall and relatively low night temperatures, at least during part of the year. It was observed that susceptibility to this disease varies greatly.

Witches' broom, caused by *Marasmius perniciosus*, was not identified. On dead branches in an almost abandoned old plantation, small sporophores similar to those of the genus *Mycena*, which was reported by Orellana [2] to cause a brooming disease in Haiti, were observed. The species was not identified.

Coffee

Since the coffee plantations which were visited were not all in good condition, it was difficult to ascertain the effect of diseases on yields. Brown eye spot (*Cercospora coffeicola*) was found to be widespread, with particularly severe attacks occurring in nurseries. The American leaf spot (*Omphalia flavida*) was observed only in a few humid places in the mountains at an altitude of 700 meters, causing rather severe leaf fall. Root rot, probably due to *Rosellinia coffeicola*, inflicts severe injuries and

[2] ORELLANA, R. G. 1956. Cacao diseases in Haiti. *FAO Plant Prot. Bull.* 4: 148–151.

Abandoned
map 39

map

often causes the death of seedlings. In the mountains near Monseñor Noel, widespread infections of an unidentified nematode were identified.

Tobacco

Tobacco mosaic is quite common and often causes serious losses. A disease locally known as *polvillo*, which is characterized by the presence of internal and external necrotic stripes in the stem, was observed at Licey. In plants affected by a disease known as *pata prieta*, *Phytophthora parasitica* (?) and *Fusarium* sp. were found. On plants growing under poor conditions, a foot rot with coffee-colored lesions in the rind occurred, and from these lesions *Rhizoctonia solani* was isolated on several occasions. *Cercospora* leaf spot is common but receives little attention from growers.

Fruit trees

Near La Vega and elsewhere, sweet orange (*Citrus sinensis*) was found to be affected by foot rot due to *Phytophthora parasitica*. Infections sometimes even occurred on trees grafted on resistant rootstocks. This is due to the practice of covering the trunk with soil above the bud union, thus bringing the soil-borne fungus into contact with the susceptible part of the tree. Sour orange scab (*Elsinoe fawcetti*) occurs on sweet orange but attacks only leaves.

Citrus production has been on the decline during the past years, and it should be of interest to investigate to what extent this decline is due to disease, and especially the role of virus disease on tree productivity.

Mango trees are commonly affected by *Colletotrichum gloeosporiodes*, *Meliola mangiferae* and, depending on the presence of scale insects (*Diaspididae*), by *Septobasidium* spp.

On papaya, symptoms similar to those of mosaic, recently reported from Puerto Rico, were observed.

The cultivation of grape vines has been on the increase. Downy mildew (*Plasmopora viticola*) seems to be less important than in other grape-growing areas, probably due to the use of species known for their resistance to downy mildew, such as *Vitis tiliaefolia*. On the other hand, powdery mildew (*Uncinula necator*) and anthracnose (*Elsinoe ampelina*) are widespread and rather serious. Rust (*Phakopsora vitis*) is of some importance only in the area of Moca. map 234

Groundnuts

Near San José de Ocoa and elsewhere, southern blight, caused by *Sclerotium rolfsii*, inflicts severe losses, in some cases as high as 30 percent. Leaf spot caused by *Cercospora personata* and rust (*Puccinia arachidis*) were also observed. Rust can cause severe damage, especially on varieties introduced from the United States which are resistant to *C. personata* but not to rust. map 160

Beans

Beans constitute a very important food crop and are affected by many diseases. Most important are those attacking the aerial part of the plant, such as anthracnose (*Colletotrichum lindemuthianum*), angular leaf spot (*Isariopsis griseola*) and rust (*Uromyces phaseoli typica*). Root rot caused by *Macrophomina phaseoli*, common bean mosaic and yellow bean mosaic, were also noticed. Leaf spot caused by *Cercospora canescens* seemed less prevalent.

Potatoes

Potatoes are grown almost the entire year. The two most important diseases attacking potatoes are early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*); the relative prevalence of these two diseases depends to a great extent on the time of planting. map 89

In the Constanza valley, at 1,200 to 1,400 meters above sea level, three potato crops are grown each year in the same field. Some varieties, introduced from the United States, such as Katahdin and Irish, are grown here, but for the second crop, when late blight outbreaks are prevalent, the local variety Gengibre is preferred. In the San José de Ocoa area, three crops are also grown in one year but at different altitudes, varying from 500 to 900 meters, accord-

ing to the season. In this area, varieties from the United States are dominant, especially Katahdin.

Diseases attacking potato tubers, such as scab (*Actinomyces scabies*) and *Fusarium* rot, are of minor incidence.

Other crops

On vegetable crops and flowers, the following diseases were observed:

Chilli:	mosaic, *Cercospora capsici*
Onion:	*Alternaria porri*, *Colletotrichum circinans*
Lettuce:	*Sclerotinia* sp.
Parsnip:	*Ramularia pastinacea* (?)
Cucumber:	mosaic
Beets:	*Cercospora beticola*, *Oidium* sp.
Cabbage:	*Alternaria brassicae*, *Oidium* sp.
Tomato:	mosaic, *Alternaria solani*, *Phytophthora infestans*, *Verticillium* sp., *Leveillula taurica*
Watermelon:	*Pseudoperonospora cubensis*
Gladiolus:	mosaic, *Heterosporium* sp.
Zinnia:	*Erysiphe cichoracearum*

Presence of Tristeza and Other Virus Diseases of Citrus in Bombay State, India

by *R. L. Nagpal*, College of Agriculture, Poona

Citrus trees in Bombay State, especially those of sweet and mandarin oranges, are known to suffer from various decline diseases which are commonly referred to as "dieback." The presence of tristeza and other viruses in these trees was suspected by the writer (1) as early as 1954, and since then considerable work has been done which has definitely established the occurrence of tristeza and possibly also xyloporosis and psorosis.

Citrus trees with symptoms of both sudden wilt and gradual decline were revealed as a result of an extensive survey. Such trees usually bear a heavy crop of fruit before the onset of sudden wilt. A study of the root system of a diseased tree showed an almost complete absence of feeding roots. A comparison of the starch contents between healthy and diseased trees indicated, in affected trees, an accumulation of carbohydrates in the top and a gradual depletion of carbohydrates from the extremity of roots, such as is found in tristeza-affected trees in North America. A diseased tree contained in the bark of its small terminal roots only 27 percent the amount of carbohydrates of a healthy tree, in the bark of its medium-sized roots 37 percent, and in the bark of its thick roots adjacent to the stem 70 percent. This seems to indicate that the progressive depletion of carbohydrates begins from the terminal roots. In contrast with the roots, the bark of the stock in a diseased tree immediately below the bud union contained 110 percent of carbohydrates. Similarly, the bark of the scion of a diseased tree also had higher carbohydrate content than that of a healthy tree. Anatomically, the phloem in the bark of the stock near the bud union showed a pronounced necrosis, which was also described by Schneider (3) in tristeza-affected trees.

Budwood taken from trees showing symptoms of decline was grafted on sour lime seedlings. The typical symptom of vein clearing, as reported by Wallace and Drake (4) on Mexican lime seedlings, was found to develop in leaves of sour lime within two to four months after inoculation, whereas the uninoculated seedlings remained healthy. The bark of sour lime seedlings was peeled off about six months after inoculation, and pitting in the form of elongated depressions were found on inoculated seedlings. Pronounced pitting was also observed on sour lime trees budded on Jamburi rootstocks in the area above bud union (Figure 1).

In 1955, budwood taken from about a dozen different sources was budded on sour orange seedlings, and of the more than 150 successfully budded plants, none survived beyond one year from the time of budding. The new growth started to wilt in two months after sprouting, and within a year all the plants had died.

Subsequently, another inoculation test was carried out in late 1957 and early 1958, in which young seedlings of more than 20 different rootstocks were budded with scions from the following three sources:

a) trees from the Ganeshkhind Fruit Experiment Station, Poona, which by budding on sour lime had produced tristeza and xyloporosis symptoms;
b) apparently healthy trees, which had not been indexed for virus diseases, from a location 300 miles distant from Poona;
c) nucellar seedlings from trees of the Ganeshkhind Fruit Experiment Station.

When the budwood originating from the first two sources was grafted on sour oranges, grapefruit and sour lime, 15 to 25 percent of the budlings wilted and died within four months. Nearly all of the remaining budlings showed symptoms of malnutrition and decline, and they

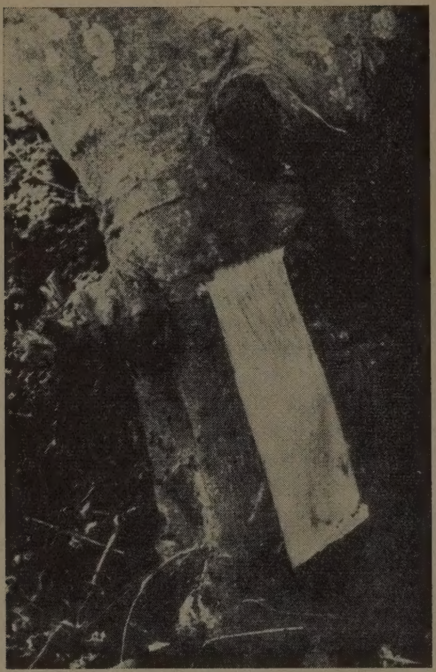

Figure 1. Sour lime on Jamburi rootstock, showing conspicuous pitting in sour lime wood above the bud union.

Figure 2. Mosambi sweet orange on sweet lime rootstock, showing moderate pitting on the stock.

were expected to die within a year or two. On the other hand, when budwood from nucellar seedlings was grafted on the same rootstocks, the budlings appeared healthy and vigorous, and grew much quicker than those with budwood from other sources. None of these specimens has died to date.

These inoculation tests, using budwood from various sources for grafting on sour orange and sour lime stocks, indicate that tristeza is widespread in Bombay State and that apparently healthy trees also carry the virus.

Characteristic but moderate pitting was observed on sweet lime stock which was budded with the sweet orange variety Mosambi (Figure 2). In addition, asymetrical or lopsided fruit, as reported by Reichert and Perlberger (2), was also observed. This appears to indicate the presence of xyloporosis.

Symptoms characteristic of psorosis A and psorosis B with gum formation were also found on citrus trees in many locations in Bombay State.

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Grape *Phylloxera* Infestation in the Region of Cuyo, Argentina

by *José Vega*, Instituto Nacional de Tecnología Agropecuaria, Mendoza

The Cuyo area comprises the provinces of San Luis, Mendoza and San Juan, and is adjacent to the Pampa on the east and to the Andes on the west. This area extends about 300 kilometers from east to west and 700 kilometers from north to south. The province of San Luis, situated in the east, is a dry, mainly cattle-raising area with 500 to 600 millimeters of annual rainfall. The provinces of Mendoza and San Juan in the west have a desert climate with normally less than 200 millimeters of annual rainfall. These two provinces are the main grape-growing areas of Argentina, with 90 percent of the total area under this crop. It is estimated that Mendoza has actually 160,000 hectares of vineyards and San Juan 40,000, of a total of 220,000 hectares for the whole country.

In Argentina, the land planted to grapevines is increasing at the rate of about 6,000 hectares a year, of which 3,500 hectares are in Mendoza. In 1955, this province produced 1,609,200 metric tons of grapes, from which 12,591,000 hectoliters of wine were obtained. This was a record yield, not equaled during the three subsequent years, due to inclement weather. As a result, and since the demand for wine exceeds the supply, grape-growing is rapidly increasing.

In the province of Mendoza, wine production represents 65 percent of its total agricultural and industrial output, and in the province of San Juan, it is as high as 90 percent. This indicates the significance of viticulture in this area, and any factor which might present a threat to the industry is of vital importance. Chief among such hazards is *Phylloxera*.

Historical background

The grapevine was introduced into Argentina in the mid-sixteenth century by the Spanish conquistadores from Peru and Chile. It is said that the introduction into Mendoza took place a few years after the founding of its capital in 1561, but grape-growing expanded only after the railroad from Buenos Aires to Villa Mercedes, Mendoza and San Juan was completed in 1885, which permitted the shipping of wine to the major consumer centers on the east coast.

The railway also facilitated immigration from Europe, and the immigrants coming from the traditional wine-producing areas of Italy, Spain and France, introduced European methods of grape-growing. At the end of the last century and the beginning of the present, a large number of varieties was thus introduced, often for sentimental reasons, without any planning or phytosanitary precautions, except for sporadic governmental inspection.

Through indiscriminate importation of plant material, *Phylloxera* was introduced into the southern part of the province of Buenos Aires near Bahia Blanca probably from Marseilles, France, about 1878.

It is of interest that the discovery of *Phylloxera* in Argentina coincides with the adoption by the government of the first restrictive measures permitting the importation of vines from European areas only on condition that they be free from *Phylloxera* (Decree of 26 August 1874). These regulations were amended by further provisions at the end of the century. No further attention was paid to the hazard of *Phylloxera* until 1921, when the pest was discovered in the Rio Negro valley in the south, and successively in the province of San Juan in 1929 and in Mendoza in 1936. The fear which the recurrence of *Phylloxera* engendered, often hindered introduction of valuable material into Argentina from European countries.

When the provinces of Mendoza and San Juan became infested, *Phylloxera* was found at first on one side of the rivers which provide irri-

gation water. Based on this observation, it was assumed that streams were a natural barrier. To prevent the pest from spreading, certain areas were quarantined and measures adopted to prevent the transportation of planting material, especially across bridges.

These measures proved ineffective. In San Juan, the first outbreak occurred in the southern part of the province, and within the relatively short time of 15 years, it appeared in the north in 1945. A survey carried out in 1947 showed that the entire province was infested.

In Mendoza, four foci were discovered about the same time but spread was slower than in San Juan. In 1945, in the most severely infested area, 42 percent of the vineyards were affected. Today it is estimated that 70 percent of the vineyards are invaded by *Phylloxera*. The various rate of distribution of the pest in San Juan and in Mendoza may be due to differences in the enforcement of phytosanitary measures, as well as the fact that the grape-growing areas in Mendoza are distant from each other. Furthermore, their ecological conditions are unlike those of San Juan. At present, there are foci of *Phylloxera* in 97.32 percent of the grape-growing areas of Argentina. Their distribution is indicated in Figure 1.

Characteristics of Phylloxera *in Cuyo and factors affecting its distribution*

In Mendoza and San Juan, *Phylloxera* is found only in its " radicicola " form and overwinters in the nymphal stage. After four molts in spring, the nymphs develop into adults which begin oviposition normally during the first half of September. The " galicola " form is not found, possibly because climatic conditions are not favorable to the development of sexual forms, although winged forms are found. In December, in the midst of the hot season, numerous nymphs with wing pads are observed which develop into parthenogenetic winged insects. On the other hand, in the more humid zones on the Atlantic coast in the province of Buenos Aires, the " galicola " forms are frequent on the varieties Rupestris du Lot and Isabella, which are popular in this area.

Ninety percent of the Argentine vineyards are situated along the Andean mountain range and are protected from the winds of the Atlantic and Pacific oceans. Therefore, the area is arid, and grapevines grow only under irrigation. In the Cuyo area they receive from 4,000 to 8,000 cubic meters of water per hectare per year.

Under these conditions it is natural to assume that irrigation water is the main factor facilitating the spread of the pest, and careful examination confirms this observation. In irrigated properties *Phylloxera* spreads in the direction of the water flow. Throughout this area, it is common practice to divide a vineyard into irrigation plots and to use the surplus water of one plot for the irrigation of an adjacent one.

Examining the soil along a row of vines, it can be observed that its texture varies in accordance with the distance from the irrigation ditch. This is most noticeable in land with considerable slope, which often reaches 1 percent in the Cuyo area. In such fields, the material carried by water is deposited according to particle size. On the upper part of the furrow is deposited sand, then silt, and clay in the bottom. After irrigation, the soil in the middle and lower part of the row becomes compact, cracks, and forms fissures through which *Phylloxera* specimens come to the surface and are carried away by water during subsequent irrigation.

In those parts of a field where soil becomes compact through the accumulation of clay, the efficiency of irrigation decreases and plants decline. In Argentina in general, and especially in the Cuyo area, there is a correlation between damage caused by *Phylloxera* and soil texture. Therefore, it is not possible to evaluate the effect of *Phylloxera* without taking into account soil conditions. In light, permeable deep soils of the Cuyo area, the presence of *Phylloxera* remains unnoticed, irrigation is efficient, plant growth is vigorous, and yield satisfactory. The contrary is observed on unfavorable soils. Thus, only few and sporadic *Phylloxera* outbreaks have occurred in Cuyo involving only small areas, while in the province of Cordoba in central Argentina, and in the parts of Mendoza and San Juan with unfavorable soil conditions and scarce irrigation water, the contrary is true.

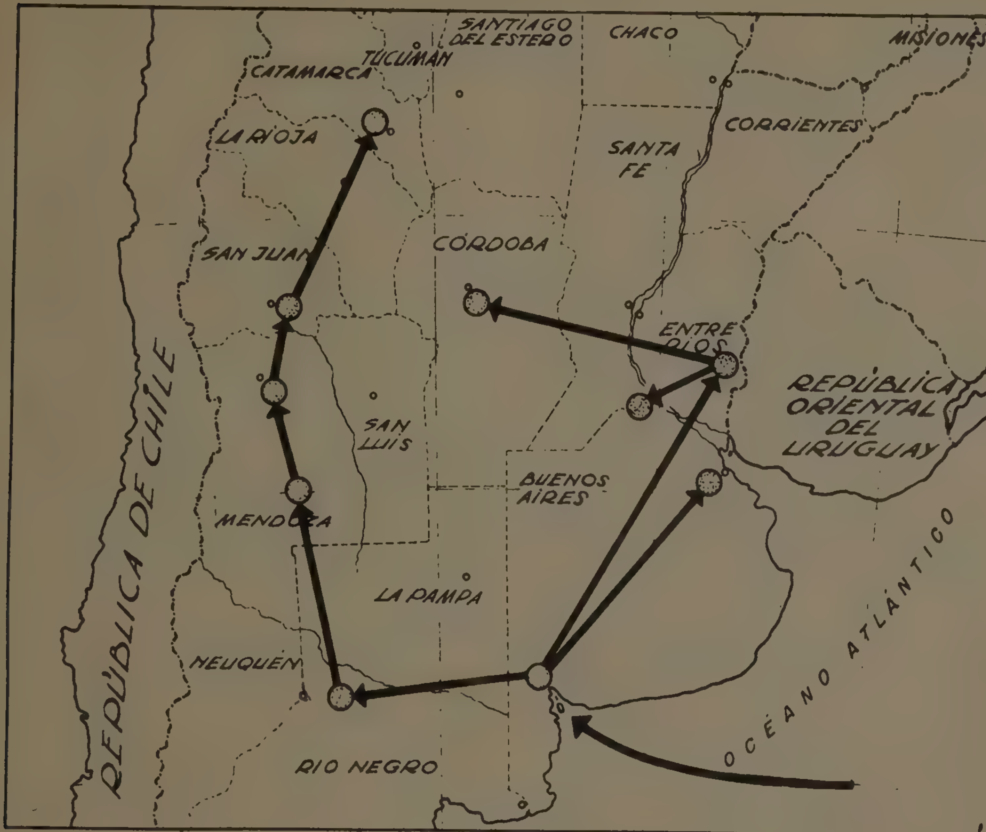

Figure 1. Pattern of distribution of *Phylloxera* in the grape-growing areas of Argentina.

In general, on soils that do not permit deep root penetration, such as superficially compact soils, on stony and permeable soils, or in areas with a high water table, *Phylloxera* damage might be expected. In such soils, the roots are exposed to large colonies of *Phylloxera* which, during summer in the Cuyo area, are located at a depth of 20 to 40 centimeters. In such areas, farmers have interplanted olive trees to counterbalance economic losses. This is an unfortunate plant association, as it has been observed that after about 15 years there is a strong root competition between the two crops, to the disadvantage of the vineyard. The grapevine disappears and formerly good vineland is lost.

Control

In the region of Cuyo, various experiments were repeated on the control of *Phylloxera*, previously performed in European countries. The efforts to prevent the spread of *Phylloxera* through quarantine were not successful, and the same was true of control methods, such as submerging the fields under water during winter, or fumigation with either pure or emulsified carbon bisulfide. As to the use of resistant rootstock, it is practiced by viticulturists only to a limited extent, chiefly on account of the high cost of budwood and also because there have not been observed reductions of yields

which could not be attributed to causes other than *Phylloxera*. In the provinces of Buenos Aires and Cordoba, the use of resistant rootstock has become a general practice but represents only 2.56 percent of the total vineyard area of Argentina. In the Cuyo area it is estimated that the area planted in grafted vines does not exceed 8 percent.

The popular variety of rootstock in this country is Rupestris du Lot. In the Cuyo area, the varieties 101/14, Rupestris du Lot, 5BB, R. 31, and other European varieties, are used in the order of preference stated. Many plantings of Rupestris du Lot are infected by the vine roncet virus[1] and thorough roguing should be carried out.

The suitability of various rootstocks to the Cuyo area has been studied for more than 20 years by official institutions and growers. In general, many varieties developed in other countries are perfectly adaptable to Argentina. Adaptability of rootstocks to the soil is the main requisite for success with grafted vineyards in the Cuyo area. Although there are no problems of alcalinity, the crosses of Berlandieri with Riparia and Berlandieri with Rupestris are superior and will probably replace No. 101/14 and other popular rootstocks.

Summary

Although *Phylloxera* has been known to occur for about 40 years in the Cuyo area, heavy outbreaks with economic consequences have not been experienced up to the present. The reasons for this delay are unknown, for the factors involved are complex. It might be that the insect is still in a state of dispersion, or that the ecological conditions required for vine-growing in the Cuyo area, in addition to irrigation and to fertilization of the soil by the substances carried with irrigation water, are so favorable, that the damage caused is not noticeable. This should not lead to an exaggerated optimism. All depends on time, and Argentina will probably not escape the consequences of *Phylloxera* which have been disastrous in other countries.

[1] VEGA J. and A. J. ALCALDE. 1955. La degeneración infecciosa de la vid en Mendoza. *Idia* 85 : 3–21.

Outbreaks and New Records

ISRAEL

by *I. Harpaz*, Faculty of Agriculture, Hebrew University, and *G. Minz* and *F. Nitzani*, Agricultural Research Station, Rehovot

Dwarf disease of maize

An outbreak of a dwarf disease of maize occurred in Israel during late spring and early summer of 1958. Newly affected plants, though only in small numbers, were also observed during later stages of the development of host plants throughout the summer and autumn. Although the disease has been recorded from all parts of the country wherever maize is grown, the central part of the coastal plain has been most heavily affected. The disease incidence during the peak of the outbreak in June ranged from 3 to 60 percent of the plants in the field, varying with the region, the season and the maize variety. It is believed that this disease appeared already last year but to a much lesser extent. So far only maize is known to be affected.

The symptoms of the disease appear to be identical with those of *nanismo ruvido* (rough dwarf) recorded from north and central Italy, as described fully in a recent paper by Grancini.[1] The only slight difference is that in Israel the swellings of the veins on the lower surface of the affected leaves are much less pronounced, as compared with those designated by Biraghi[2] as veinal hyperplasia. Based upon the comparison of symptoms only, the disease seems to bear no resemblance to corn stunt of the Western Hemisphere, as reported by Maramorosch.[3]

It is assumed that the disease is caused by a virus, though no experimental transmission has yet been accomplished. In a number of instances, *Fusarium* spp., nematodes of the genus *Trichodorus* and false wireworms were found in the roots of dwarfed plants, but in most cases none of those organisms could be considered as the cause of dwarfing; nor was there any other primary bacterial or fungus infection involved. The possibility of a nutritional deficiency is likewise ruled out, owing to the sporadic nature of the distribution of the disease in the field.

A team of plant pathologists and entomologists has been formed from the staff of the Agricultural Research Station, Rehovot, and the Faculty of Agriculture of the Hebrew University, to investigate the disease. The problems which will receive primary attention will include the mode of transmission and vectors, varietal susceptibility of maize, seasonal and geographic distribution of the disease, and effective control methods.

UNITED KINGDOM (England)

Plant Pathology Laboratory, Ministry of Agriculture, Fisheries and Food, Harpenden

Fire blight of pome fruits

In the late summer of 1957 symptoms strongly suggestive of fire blight were observed on pear trees (*Pyrus communis*) on five farms in Kent, England. An extensive study of the disease by Dr. J. E. Crosse of the East Malling Research Station conclusively established the identity of the disease with fire blight and the identity of the causal pathogen with *Erwinia amylovora*. In 1958 three further outbreaks were discovered

[1] Grancini, P. 1958. I sintomi del « nanismo ruvido » del mais. *Maydica* 3: 67-79.

[2] Biraghi, A. 1952. Ulteriore contributo alla conoscenza del « nanismo ruvido » del mais. *Ann. Sper. Agr. N. S.* 6: 1043-1053.

[3] Maramorosch, K. 1955. The occurrence of two distinct types of corn stunt in Mexico. *Plant Dis. Reptr.* 39: 896-898.

in Kent and one in Worcestershire, but a special survey of pear orchards in the main fruit-growing areas of England failed to reveal the presence of the disease elsewhere. It is estimated that on the nine infected places about 1,500 pear trees, mostly of the variety Laxton's Superb, have been attacked. Other pear varieties, including Conference, Williams, Bon Chrétien, Dr. Jules Guyot, Doyenné de Comice, Beurré Hardy and Fondante de Thiriott, have been attacked, though not on such a wide scale as Laxton's Superb. As yet no outbreaks have been found on apple (*Malus sylvestris*), although apple is a host for *E. amylovora* and there is laboratory evidence that the isolates from the pears will attack apples.

On present evidence it is unlikely that fire blight has been present in England for more than two or three years, and every attempt is being made to eradicate it. Wide publicity has been given to the disease and, because infection occurs mainly during the blossoming period, efforts are being made during the winter of 1958/59 to destroy all trees known to be infected. Under a new (statutory) Fire Blight Disease Order, which came into operation on 6 November 1958, the disease is made a notifiable one and powers are taken to compel the removal and destruction of any trees or parts of trees infected with fire blight.

Although fire blight has been known for many years as a scourge of apple and pear trees in North America, there has hitherto been no authentic record of its occurrence in Europe. It was introduced into New Zealand in the 1920s, probably with fruit trees from the United States, and it is also said to occur in Japan, Southeast Asia and India. (The above information was received through the European and Mediterranean Plant Protection Organization.)

Plant Quarantine Announcements

GUATEMALA

A Ministerial Decree of 26 April 1958, published in the *El Guatemalteco*, Vol. 153, No. 17 of 3 May 1958, regulates the importation of cotton seed.

Importation of cotton seed must be first approved by the Ministry of Agriculture. Cotton seed to be imported from countries, where according to information from international organizations certain cotton pests and diseases occur, must originate from a station engaged in the production of cotton seed. The station must certify that the seed is free of diseases and pests, the introduction of which is prohibited. In addition, each shipment must be accompanied by a phytosanitary certificate indicating the chemical treatment to which the seed has been subjected. Cotton seed originating from countries in which certain pests and diseases are not known to exist, must be accompanied by a phytosanitary certificate indicating the chemical treatment applied.

HUNGARY

The Hungarian Plant Protection Service has recently published an abstract of Orders Nos. 103/1951-MT, 18055/1951-FM and 11/1955-FM, outlining the main provisions regulating the importation of plants and plant material.

General provisions

Shipments of living plants, parts thereof, plant materials or seeds will not be permitted to enter the country under the following conditions:

1. if they are not sealed and accompanied by a phytosanitary certificate and a certificate of origin; consignments shipped by boat need not be sealed;
2. if they are not free of soil that might harbor pests in any stage of development;
3. if they originate from a country that has no plant protection service, in which case a special permit from the minister of agriculture is required;
4. if they do not conform with phytosanitary regulations.

Importation prohibited

1. Soil, organic fertilizers, compost. Plants with earth ball may be imported only with the authorization of the minister of agriculture and in accordance with the conditions prescribed in each case.
2. Roots, stems and leaves of potatoes, tomatoes and eggplants.

Importation restricted

1. Consignments of plant materials (including seed, shoots, bulbs, tubers, budwood, root or stem cuttings, cut flowers, blossoms, stems, leaves, fruits, raw cotton and all other plant material for food, fodder or processing) may be imported, exported or transported only if accompanied by an official certificate of the country of origin stating that the consignment is free from dangerous pests and diseases. This restriction also applies to flowering plants with roots.
2. Potatoes must be free from Colorado beetle (*Leptinotarsa decemlineata*) and certified to have originated from a place where Colorado beetle does not occur within a distance of 20 kilometers. Seed potatoes may be imported from Colorado beetle-infested countries only with special authorization from the minister of agriculture. Potatoes may not be imported from countries where *Epitrix cucumeris* occurs, and must be accompanied by a certificate stating that they originate from a place free from potato tuber moth (*Phthorimaea operculella*), and that potato wart (*Synchytrium endobioticum*) had not occurred during the last five years within a

distance of 5 kilometers. Seed potatoes may be imported from countries infested with potato wart, with special authorization from the minister of agriculture.

3. Cotton seed and raw cotton must be free from pink bollworm (*Pectinophora gossypiella*) and accompanied by a certificate stating that the place of origin is free from this pest. Up to 2 percent of seed infected with bacterial blight (*Pseudomonas malvacearum*) is permitted.
4. Seed of alfalfa, red clover and other clover species, *Starya hortensis* and timothy (*Phleum pratense*), must be free from *Cuscuta* and clover seed; it must also be free from *Helminthia* (*Picris*) *echioides*. A certificate by the seed inspection service of the country of origin is acceptable.
5. Onions and onion seed must be free from onion smut (*Urocystis cepulae*).
6. Sunflower seed must be free from *Orobanche cernua* and certified that the place of origin is not subject to this weed.
7. Legume must be free from halo blight (*Pseudomonas phaseolicola*), bacterial blight (*Xanthomonas phaseoli*) and bean weevil *Acanthoscelides obtectus*, and accompanied by a fumigation certificate. Infection of seed up to 3 percent by *Corynebacterium flaccumfaciens* or by pea weevil (*Bruchus pisorum*) is permissible.
8. Rice, wheat and maize must be free from rice weevil (*Calandra oryzae*) and granary weevil (*Calandra granaria*). Up to two live adults per kilogram are permissible but the consignment must be fumigated.
9. Vegetables and ornamental plants must be free from *Xanthomonas hyacinthi* and *Botrytis tulipae*.
10. Citrus fruit and trees must be free from Mediterranean fruit fly (*Ceratitis capitata*), citrus canker (*Xanthomonas citri*) and scale insects (*Lepidosaphe*, *Chrysomphalus*). Infestation with scale insects up to 5 percent is admissible.
11. Fruit tree seedlings must be accompanied by a certificate stating that they originate from a virus-free nursery and have been fumigated with hydrocyanic acid gas.
12. Rooted and nonrooted grapevine cuttings must be accompanied by a certificate stating that they have been fumigated with hydrocyanic acid gas.
13. Cut flowers and wild flowers without root and soil, including bindings, must be accompanied by a certificate stating that they are free from dangerous pests and diseases. This restriction does not apply to flowers carried by travelers.

Prohibited pests and diseases

Leptinotarsa decemlineata
Heterodera rostochiensis
Epitrix cucumeris
Phthorimaea operculella
Synchytrium endobioticum
Spongospora subterranea
Pectinophora gossypiella
Anthonomus grandis
Cuscuta spp.
Helminthia (*Picris*) *echioides*
Mycosphaerella linorum
Colletotrichum lini
Acanthoscelides obtectus
Rhagoletis pomonella
Quadraspidiotus perniciosus
Agrobacterium tumefaciens
Hyphantria cunea
Phylloxera vitifolii
Court noué
Orobanche cumana
Ceratitis capitata
Viruses of stone fruit trees, including peach yellows and little peach
Calliptamus italicus
Cenchrus tribuloides
Cronartium ribicola
Lymantria (*Ocneria*) *monacha*
Pseudomonas syringae f. sp. *populea*
Rhabdocline pseudotsugae
Ophiostoma quercus
Ditylenchus destructor

News and Notes

International Botanical Congress

The Secretariat of the Ninth International Botanical Congress which will be held in Montreal, Canada, from 19 to 29 August 1959, has issued a second circular giving further information on the program, field trips and accommodations. Applications for membership and accommodations must be sent to the Secretariat before 15 March 1959.

It is expected that the total attendance will be about 6,000.

The Section of Phytopathology will cover all aspects of plant diseases caused by fungi, bacteria, viruses and physiological disorders, as well as diseases caused by nematodes, physiology of plant pathogens and fundamental work on plant viruses. The following symposia will be held under this Section:

1. The physiology of host-parasite relations (H. Kern)
2. Progress in the control of plant viruses (R. E. Fitzpatrick)
3. Transmission of plant viruses by aphids (M. A. Watson)
4. The relation of parasitic nematodes to plants (E. J. Cairns)
5. Genetic contributions to the understanding of parasitism (T. Johnson)
6. Mechanisms of tumor formation in plants (A. C. Braun)
7. The parasitism of overwintering plants by low temperature fungi (J. G. Dickson)
8. The pathogenesis of root degeneration (L. W. Koch)
9. Specialization and host-parasite relations in the rusts (E. C. Stakman)
10. Systemic and therapeutic materials in plant disease control (A. E. Diamond)
11. Nature and inheritance of disease resistance (J. C. Walker)

Enquiries about the Congress should be addressed to the Secretary, IX International Botanical Congress, Science Service Building, Ottawa, Canada.

Insect pests of cotton in tropical Africa

The insect pests of cotton in tropical Africa, written by E. O. Pearson and published recently by the Commonwealth Institute of Entomology, represents the first attempt to deal on a continent-wide basis with the pests of any of the principal crops of Africa. It provides a concise and critical résumé of the available information, formerly scattered through the literature, and much hitherto unpublished information is also included.

The book contains two introductory sections, the first dealing with the structure of the cotton plant and the background to its cultivation in tropical Africa, and the second giving a general account of cotton pests as regards the systematic groups to which they belong, their geographical distribution and the nature of their association with cotton, together with a summary of what insects and diseases affect the different parts of the cotton plant in Africa, and a discussion of the effects of insect attack on yield. Brief notes are given on each of the cotton-growing areas in Africa south of the Sahara and their principal pests. There is a key to the disorders affecting cotton in Africa, based on symptoms visible in the field.

The main section of the book consists of an account of each of the more important pests, dealing with the taxonomy and distribution, appearance of the different stages, life history and seasonal activity, nature of the damage inflicted on cotton, alternative host plants, natural enemies, factors affecting prevalence, and control. In the case of species or groups that are not confined to tropical Africa, relevant matter available from research on them elsewhere is included.

The book is obtainable from the Commonwealth Institute of Entomology, 56, Queen's Gate, London, S. W. 7, England.

ROMA, 1958 Tipografia del Senato del Dott. G. Bardi.

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